City of Greensboro
Water Resources Department
Sewage Collection and Water Reclamation Plant Report for 2009

INTRODUCTION

The Clean Water Act of 1999 (House Bill 1160) requires all entities that own or operate wastewater collection and treatment systems to make an annual report available to their customers. The report must detail how a system operates, how well it performed during the year, what violations occurred, and other information. This report is produced in compliance with these requirements and covers the calendar year January - December 2009.

The City of Greensboro Water Resources Department operates two water reclamation plants and a sewage collection system that collects and transports the sewage to these two plants; some transfer of sewage occurs between the two plants. Following are the professionals designated by the state as the "Operators in Responsible Charge" (ORC) of the respective systems and permits for the systems:

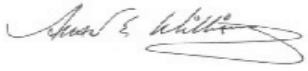
North Buffalo Water Reclamation Facility
Permit No. NC0024325, ORC Nathan Osborne, (336) 373-7850

T. Z. Osborne Water Reclamation Facility
Permit No. NC0047384, ORC Walter Kling, (336) 433-7224

Sewage Collection System
Permit No. WQCS00006
ORC Brian Foust, (336) 373-2033
ORC Patrick Smith, (336) 373-2033

This report is being made available at all City Water Resources Facilities, Libraries, the Melvin Municipal Office Building, and on the City's web site. All customers will be notified of its availability in the *At Your Service* newsletter, that are distributed in water and sewer bills from March to May 2010. This report has been compiled by staff of the Water Resources Department and its approximate cost was $1,000.

The information contained herein is accurate to the degree possible:



Allan E. Williams, Director of Water Resources

System Overview

The sewage collection and water reclamation system of the City of Greensboro begins with approximately 100,997 connections that serve homes, commercial establishments, and industries. Every day an average of 29 million gallons of sewage is generated in our homes and industries that must be collected, transported, and treated to very stringent standards before it is released back into our environment (in our streams). This service is provided by the City's Water Resources Department and is funded almost entirely from the user charges that are paid monthly by our customers.

Nearly all of the sewage or wastewater that is generated by customers flows by gravity through sewers that range from 6 to 72 inches in diameter. Greensboro operates over 1,396 miles of these gravity sewer lines. As the lines leave neighborhoods they increase in size to accommodate the flows that are collected from the many areas that are served. These sewers generally follow terrain to take advantage of gravity flow but at certain low points pumping stations are used to push the flow uphill to the next drainage basin and set of lines. The City currently operates 47 pumping stations that range in capacity from 30 to 2,600 gallons per minute.

Our sewer collection system transports Greensboro's wastewater to two large water reclamation facilities. The wastewater is processed so that it can be returned to our streams with minimal environmental impact. The North Buffalo Facility and the T.Z. Osborne Facility are permitted to process up to 16 and 40 million gallons of wastewater per day, respectively.

Both City water reclamation facilities are large, complex, plants that use physical, chemical, and biological processes to clean the wastewater. It is screened and settled to remove most suspended materials, but the heart of the plant is a biological process that uses bacterial cultures to remove the largest part of the suspended and dissolved wastes that are produced within the city. This biological process, called activated sludge, is sensitive to temperature, high flows produced by rainfall leaking into sewers, and toxic discharges that can be produced by industries or even homes. This sensitivity to factors largely beyond the control of the operators of the plants makes them susceptible to process upsets that can result in discharging constituents beyond the amount permitted by regulating authorities.

Aerial photo of T. Z. Osborne Plant (located off of Huffine Mill Road)

Aerial photo of North Buffalo Plant (located off of White Street)

Greensboro's Difficult Location

Aerial photo of Lake Townsend

Many of Greensboro's residents recognize that our location is not ideal for water supply development; our streams are very small because we are at the top of the watershed where our streams drain limited amounts of land. What they may not recognize is that this makes wastewater reclamation very difficult as well. The permitting of treated wastewater discharges makes the assumption that streamflow is at the lowest volume so as to offer the protection needed when streamflow is at its lowest. In North Carolina, this means the "7 Q 10" flow, or the lowest seven day flow expected every ten years. The permit limits for discharges takes this level of stream protection into account in calculating the limits; yet it applies 24 hours per day, 7 days per week, 365 days per year. Since Greensboro's limits are calculated for discharging to such small streams, our limits are very low. Not only does North Carolina have some of the most stringent stream standards in the country, Greensboro is a large city located on very small streams. Our discharge flow constitutes over 97% of the stream below our discharge points at the lowest stream-flows; therefore our permits are written so as to protect the streams at all times as though such minimal flow was present.

Treatment Plant Performance

The City of Greensboro's treatment plants operate under National Pollutant Discharge Elimination System permits, most commonly known as NPDES. These are highly complex permits that include monitoring requirements and discharge limits, some of which vary from season to season and have different maximums for daily values, weekly averages, monthly averages, and quarterly averages. Some limits protect streams from oxygen depletion, such as biochemical oxygen demand (BOD) and ammonia-nitrogen (which exerts oxygen demand over a delayed yet prolonged basis). There are other limits that work to protect aquatic life in the receiving stream such as metals like cadmium or selenium or other constituents like fluoride or cyanide. These constituents are limited as low as 12 parts per trillion and in many cases are lower than drinking water standards, because aquatic life is more sensitive than humans to these materials. One standard, fecal coliform, is designed to test for indicator bacteria to determine whether or not sufficient chemicals have been applied to disinfect the flow prior to discharge. The permits are complex and can be viewed at our treatment plants upon request.

Compliance with these permits requires that our laboratory must conduct over 10,500 tests per year. Any one of these tests may result in a value that causes us to violate the limits of the NPDES permit. When a sample is taken at its specified time, to even accidentally drop it or allow it to linger longer than permitted before refrigeration or analysis can result in a violation. There are some limits, such as cyanide, fluoride, selenium, and cadmium, over which the operators of the treatment plant have no control other than through regulating what industry and households can discharge to the sewers.

During 2009 the Water Resources Department treated 10.8 billion gallons of wastewater and returned it to our streams. We are proud of the outstanding performance of these facilities that was made possible by the dedicated efforts of the professionals who operate, maintain, and conduct tests for these facilities. However, despite these efforts we reported the following violations of the NPDES permit to the state. Each and every one of these was reported to the State of North Carolina in compliance with all reporting regulations and is included at the end of this report as Table 1 (T. Z. Osborne) and Table 2 (North Buffalo). There were no detected environmental impacts from any of these permit excursions.

Clean water returns to our streams

Collection System Performance

The City of Greensboro operates a sewage collection system comprised of 1,396 miles of gravity line, 33,245 manholes, 47 pump stations, and 74 miles of pressurized sewage force main. The system is subject to many rules and regulations that are now in effect. Most notably, if sewage escapes from the collection system for whatever reason and exceeds 1,000 gallons, it must be reported to all outlets of the news media. In addition, all spills of any volume reaching a water body must be reported to the State.

Sewage spills from a collection system can be caused by a number of reasons. Tree roots can find their way into sewer lines obstructing them, grease from residences or commercial establishments can collect in sewers and obstruct them, foreign objects can be dropped in sewers or manholes, rainwater can find its way into sewers overloading them, and pump stations can fail for mechanical or electrical reasons. Greensboro, like all cities, has experienced these problems in the last year of operation. A list of sewage spills in excess of 1,000 gallons that reached surface waters is included at the end of this report and labeled as Table 3. There were no detected environmental impacts from any of these incidents.

Reserve Lift Station

System Improvements

The City of Greensboro has an on-going cleaning and inspection program to monitor and maintain our sewer system, including rodding, high pressure flushing, and closed circuit television inspection of lines. The City has an aggressive program to rehabilitate old leaking sewer lines to begin reducing the amount of rainwater entering our collection system. The total spending amount for rehabilitation exceeds $3 million per year.

We are also enhancing our regulation of grease discharge in those areas where we are experiencing grease buildup in lines. While we maintain generators at many stations and can move mobile generators to the others, we are investigating the installation of automatic backup at stations that experience repeat loss of power that cannot be restored quickly. It should be noted that of the 10.8 ***b***illion gallons of sewage produced in Greensboro in 2008, 18,740 gallons escaped our system, which is only 2 gallons per ***m***illion transported.

The Water Resources Department is currently preparing to upgrade the City's two water reclamation plants to comply with recently issued regulation known as the "Jordan Lake Rules." The rules were issued to offer water quality protection to the B. Everett Jordan Reservoir by reducing the amount of nutrients, specifically nitrogen and phosphorus, that enter streams the empty to this water body. The rules impact development, current stormwater discharge methods, agriculture, and the discharge of treated municipal wastewater. The new more stringent NPDES phosphorus limits were effective January 1, 2010 and the total nitrogen NPDES limits, which will require additional treatment processes will be effective January 1, 2016. The City anticipated these requirements and began pilot testing cutting edge processes several years ago to find the most cost effective way to meet the limits, which are effective January 1, 2016. Process decisions are being made, and it is anticipated that construction will begin in early 2013. The improvements will cost approximately $75 million in capital expenses and will increase operating costs as well. A rate increases of 10-20% for sewer charges can be expected for these improvements.

Fats, Oils and Grease (FOG) Program

FOG Mascot "Grease Gremlin"

It is the duty and responsibility of the City of Greensboro Water Resources Department to prevent the excessive introduction of oil and grease into the sanitary sewer system and the wastewater treatment plants. The FOG policy is designed to outline, implement and enforce oil and grease discharge rules and to have an educational program for both residential and commercial users. This policy is applicable to all food service establishments that discharge wastewater containing grease to the City of Greensboro Sanitary Sewer System. In order to reduce sewer blockages, food service establishments discharging wastewater that contains grease to the City of Greensboro sanitary sewer system must install and maintain a grease trap or grease interceptor to prevent grease from entering the sewer system. The accumulation of grease within sanitary sewer lines increases the potential to create sewer blockages. Sanitary sewer blockages can result in sanitary sewer overflows (SSOs), which may reach the surface waters of North Carolina.

Residential customers should also practice proper disposal of cooking grease by placing grease in sealed containers and discarding in the garbage. By reducing the amount of fats, oils and grease that enter the sewer system, you can help to protect the environment by preventing sewer back-ups and overflows. For more information please visit our website at www.greensboro-nc.gov/water.

Summary

The Greensboro Water Resources Department is proud that given the capacity of our treatment plants and the age of our collection system, our permit departures have been minimal, especially when compared to similar cities. We recognize however, that in the changing climate of environmental concern, total compliance is demanded by the public.

WATER RESOURCES ADMINISTRATION: 336-373-2055

T. Z. OSBORNE WATER RECLAMATION FACILITY: 336-373-7740

NORTH BUFFALO WATER RECLAMATION FACILITY: 336-373-5913

GREENSBORO

Table 1

T.Z. Osborne Publicly Owned Treatment Work
National Pollutant Discharge Eliminiation System (NPDES) Permit #NC0047384

Month	Description	Number of Violations	Type of Violation(s)
January	Mercury	1	Daily Maximum
February	Mercury	1	Daily Maximum
April	CBOD CBOD	1 1	Weekly Average Monthly Average
December	Mercury	1	Daily Maximum

Table 2

North Buffalo Publicly Owned Treatment Work
National Pollutant Discharge Eliminiation System (NPDES) Permit #NC0024325

Month	Description	Number of Violations	Type of Violation(s)
May	Mercury	1	Daily Maximum

Note: There were no environmental impacts noted for the above violations.

Definitions:

Daily Discharge – The “daily discharge” concentration comprises the mean concentration for a 24-hour sampling period as either a composite sample concentration or the arithmetic mean of all grab samples collected during that period.

Daily Maximum – The highest “daily discharge”

Weekly Average – The arithmetic mean of all “daily discharges” of a pollutant measured during the calendar week.

Monthly Average – The arithmetic mean of all “daily discharges” of a pollutant measured during the calendar month.

Table 3

Sewage Spills from Collection System Exceeding 1,000 Gallons

Permittee	Permit Number	Incident Started	Volume Reaching Surface Water	Surface Water Name	Location	Probable Cause
T.Z. Osborne	NC0047384	12/25/2009	6,200 gallons	Rock Creek	6595 Judge Adams Rd	Pump Station Equipment Failure
North Buffalo	NC0024325	12/18/2009	2,000 gallons	Little Alamance Creek	6202 Technology Dr	Unknown substance blocking line
North Buffalo	NC0024325	11/12/2009	1,200 gallons	North Buffalo Creek #2	100 Block S. Aycock St	Inflow & Infiltration
North Buffalo	NC0024325	11/12/2009	2,000 gallons	North Buffalo Creek #1	4000 Block of Henderson Rd	Inflow & Infiltration
North Buffalo	NC0024325	11/12/2009	2,000 gallons	North Buffalo Creek #1	4100 Henderson Rd	Inflow & Infiltration
North Buffalo	NC0024325	11/11/2009	2,340 gallons	Lake Townsend Creek	5403 Hollyridge Dr	Pipe Failure (Break)
North Buffalo	NC0024325	04/29/2009	3,000 gallons	East Fork Deep River	8735 W. Market St (O/F)	Paint discharged into sewer system